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THESIS

CONTRACT ISSUES
IN THE SALE OF COMMERCIAL AIRCRAFT

by

Bryan Francis Hayes

September 1983

Thesis Advisor: D. C. Boger

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The sale of large commercial aircraft is a highly competitive business, conducted between multibillion dollar corporations. It is a highly visible industry and because of its economic size and the nature of the business, it is linked with economic growth. Aircraft sales are highly cyclical and influenced by a wide variety of factors. The contract for the sale of aircraft and associated services is the vehicle which specifies the various

elements of the agreement between buyer and seller and is used by both parties to allocate risk. This thesis identifies and examines the commercial contract process and the articles or clauses in the typical industry contract, the relationship between the functional contract organization and other functional elements of the firm, and various factors of uncertainty and risk inherent in the commercial aircraft industry. This work provides insights into the contract process as well as an appreciation of the uncertainty and the magnitude of the risk in the U.S. aerospace manufacturer's commercial business activity.

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Contract Issues in the Sale of Commercial Aircraft

by

Bryan Francis Hayes
Lieutenant Commander, Supply Corps, United States Navy
B.A., University of San Francisco, 1969

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

NAVAL POSTGRADUATE SCHOOL
September 1983

ABSTRACT

The sale of large commercial aircraft is a highly competitive business, conducted between multibillion dollar corporations. It is a highly visible industry and because of its size and the nature of the business, it is linked with economic growth. Aircraft sales are highly cyclical and influenced by a wide variety of factors. The contract for the sale of aircraft and associated services is the vehicle which specifies the various elements of the agreement between buyer and seller and is used by both parties to allocate risk. This thesis identifies and examines the commercial contract process and the articles or clauses in the typical industry contract, the relationships between the functional contract organization and other functional elements of the firm, and various factors of uncertainty and risk inherent in the commercial aircraft industry. This work provides insights into the contract process as well as an appreciation of the uncertainty and the magnitude of the risk in the U.S. aerospace manufacturer's commercial business activity.

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I. INTRODUCTION

A. BACKGROUND

The dollar value of sales in the U.S. commercial aircraft industry is significant in relation to the Gross National Product of the United States. It is also one of the largest contributors to the U.S. balance of trade and, hence has worldwide political, social, and economic effects. The sale of aircraft is a dynamic and competitive business. Because of this fact, business practices and strategies are employed by each manufacturer which best fit the firm's style and which the firm feels will generate sales. This thesis identifies and describes industry-wide standards and practices regarding the contract agreement used for the sale of large commercial aircraft and associated services.

Very little has been written about commercial aircraft industry contracting practices. Therefore, this work is limited to a review of the practices of the three U.S. manufacturers of large commercial aircraft since the vast majority of sales dollars are accounted for by these aircraft. The thesis focuses on the contracting process and characteristics of the contract document. In this work, there is purposely no specific mention made of an individual manufacturing firm's contracting policies or actions. Because of the competitive nature of the business, firms are sensitive about maintaining the propriety of business practices. In recognition of this sensitivity and the confidence placed with this author, only industry-wide

practices are presented reflecting what were found to be common policies and procedures of the majority. The term industry contract is used to describe those contract articles typically found in all manufacturer's contracts. Specific firms who purchase aircraft are mentioned by name throughout the work. These are presented for the sake of examples or identification of a specific transaction.

B. LITERATURE REVIEW

A review of available literature dealing with the commercial aircraft industry provided limited information in terms of previous studies and analysis. A great deal of information concerning the industry itself is available from trade and business journals and periodicals. Information gleaned from these sources forms the basis of those chapters which provide background infomration on various aspects of the industry. Published information dealing with the contract issues of concern in the sale of commercial aircraft was even more limited. Apparently, little effort has been devoted to describing or analyzing industry-wide contracting practices. Consequently, very little printed source material or information was available. Individual aerospace firms perform some analysis of this nature but understandably do not publicize the results of such efforts. The content of the chapters dealing with the typical industry contract are based almost exclusively on interviews and discussions with manufacturers' representatives. In order to respect their confidence, direct quotes or specific practices are not identified to manufacturers. Printed materials dealing with contracting policies and procedures were also made available to this author during these interviews. Secondary sources consulted for contract information were published materials of a general nature dealing with

the aerospace and aircraft industries; from these sources industry-wide contract policies and procedures were surmised.

C. THESIS ORGANIZATION

Contract issues in the sale of commercial aircraft are the focuses of this work. Prior to presenting these issues, an overview of certain aspects of the aircraft industry is provided, specifically, applicable details of the industry, the leading manufacturing firms, and the principle purchasers of aircraft.

Chapter II provides an introduction to the commercial aircraft industry, its overall size and the potential market for the product. In Chapter III, the manufacturers of large commercial aircraft are introduced in order to provide an overview of the three U.S. manufacturers upon which the contract issues, presented in later chapters, are based. A review is provided of the firms, their product lines, and their business outlooks for the immediate future. The three U.S. firms, Boeing, McDonnell Douglas, and Lockheed, are examined. A fourth firm, Airbus Industrie, a European consortium, is also introduced. Finally, consideration is given to the factors which create demand, as well as determine the price of the aircraft.

Chapter IV presents an overview of the complement to the manufacturer, the aircraft buyer. In most instances these buyers are airlines, both domestic and foreign. Sales may be for as little as one aircraft or for over a hundred units. There is no average sale. Smaller airlines or businesses may purchase one or two units. Large airlines purchase typically ten to forty units, or more, at one time, depending on their operating strategy and financial position. The contract for all sales is essentially the same,

but, as will be seen, large quantities can certainly yield concessions on the part of the seller. As will also be shown, demand for aircraft is generated by a number of factors over which neither the buyer nor the seller have much control. Although this fact is not unique to the aircraft industry, the magnitude of the investment made for new products in the face of uncertainty is considered exceptional.

Contract issues are divided between two chapters. The contract is the formal legal document upon which the transaction to sell and buy aircraft is based. Designed around the Uniform Commercial Code, the contract lays down the terms and conditions of the sale. While the transaction is similiar to many found throughout the world for large equipment purchases, the industry does have certain unique policies and practices which are reflected in the sales process as well as in the composition of the industry contract. These factors are described in Chapter V. Also in this chapter an examination is made of the processes and practices used by the manufacturers to sell aircraft. Lastly, a review based on a survey taken by the author is made of the contract functional organization found in the aircraft manufacturer's headquarters.

Chapter VI presents the subject matter of specific articles or clauses found in contracts used throughout the industry. As noted above, these articles are typical of actual articles found in the pro forma contracts used by the three manufacturers. Policies and practices of specific firms are not identified.

The final chapter provides a summary of the contract elements provided in earlier chapters. This chapter also contains an examination of factors identified in the industry which create risk and uncertainty. As noted throughout this paper, the aircraft industry is a very risk

oriented undertaking both on the part of the manufacturer as well as the buyer. These elements of risk are presented as a summary of those factors prevalent throughout the industry.

II. THE U.S. COMMERCIAL AIRCRAFT INDUSTRY

A. INTRODUCTION

In this chapter an introduction to the aircraft industry will be provided. Included are reviews of the industry, the four major aircraft manufacturers, the market in which they conduct business, and the methodology used to establish a selling price.

The development and production of commercial air transportation equipment is a highly competitive business conducted between multibillion dollar corporations. A great deal of resources go into the design and pre-production of a new aircraft model. Financial losses from sales down turns in the industry are tremendous. Aircraft sales are highly cyclical and influenced by a wide variety of economic and regulatory factors not fully in control of the seller or the buyer. The manufacturers seek to establish a sales price for their aircraft which will not only facilitate a sale, but also, over time, cover the manufacturing costs. All sales are subject to intense competition from aircraft manufactured by other companies, both foreign and domestic, including companies with substantial resources and companies which are nationally owned or subsidized. Sales to foreign customers are highly competitive, and are influenced by corporate international relationships and the consequences of U.S. Goverment foreign policy. The political stakes of the aircraft business are rising along with the risks. U.S. manufacturers directly compete with nationally subsidized

manufacturers, such as Airbus Industires, a Western European consortium, while U.S. airlines compete with national airlines, i.e., government-owned or subsidized airlines. To be competitive, U.S. aircraft manufacturers and airlines must continually employ astute marketing practices and policies endeavoring to attain as well as maintain market share. Competition in development of an aircraft model(i.e., a new long-haul wide-body or a 150 seat aircraft), and marketing the aircraft to a few key airlines can make or break an aircraft program. Sometimes a manufacturer bets the company, in a sense, to introduce a new model because of the large capital outlays and the uncertainties involved.

B. THE AIRCRAFT INDUSTRY

In the research for this thesis, three firms engaged in the development and assembly of complete commercial aircraft were reviewed. One of the companies, Lockheed, is no longer in the commercial airframe business, curtailing production of the commercial model in 1982, with a planned shutdown of the production line in 1984. Boeing and McDonnell Douglas Corporation (MDC), the remaining two U.S. firms, along with Airbus Industrie, currently compete for the sale of large aircraft to scheduled domestic and international airlines as well as to individuals and businesses. It should be noted that all three U.S. firms have large defense business elements, from which they derive revenue as well as technological expertise and manufacturing efficiencies.

The overall industry is very large and politically important as can be seen from a review of recent sales figures. Sales for the entire U.S. aerospace industry in 1981, were $62.3 billion, which represented 2.2 percent of the Gross National Product, and 3.3 percent of total sales by all U.S. manufacturing industries [Ref. 1: p. 8]. The

industry delivered 387 transports during the 1981, 255 to foreign customers and 132 to U.S. airlines [Ref. 1: p. 19]. U.S. producers delivered approximately 245 large transport units in 1982, with a total value of $6.7 billion [Ref. 2: p. 31-3]. U.S. manufactured aircraft account for 85.3 percent of the jet powered transports and 67.6 percent of the total world turbine engine aircraft fleet [Ref. 1: p. 78]. The commercial aircraft industry earned more foreign exchange credits than any other U.S. exporter, offsetting trade deficits in other trade areas.

Entry into the airframe industry is made difficult by high initial capital requirements, output range over which economies of scale exist, and cost advantages for existing firms based on technical capability and production experience. There is a great deal of risk in developing and assembling an aircraft, either from the ground up or the modification of an existing aircraft. The industry is on the leading edge of high-technology, employing state-of-the-art equipment and materials in the manufacturing process, as well as application of stringent performance standards and absolute tolerances. Aircraft production combines the elements of metallurgy, electronics, and computer technology, along with the most advanced design and assembly processes. Manufacturers constantly seek to assure durability and improve performance of their product. Several advances in the technology employed in the new generation of aircraft will improve efficiency, particularly with regard to fuel efficiency. For example, current manufacturing processes use composite materials that are stronger than aluminum and offer about a twenty-five percent reduction in the weight of the aircraft. This material principally consists of boron, graphite, fiberglass, and kevlar. According to a spokesman for Douglas Aircraft, every 1,000 pounds of savings in weight equals forty miles more range, thus saving fuel. [Ref. 3: p. 43].

C. AIRCRAFT MANUFACTURERS

With the arrival of the wide-body era in the late 1960s, Boeing, MDC, and Lockheed were locked in competition as they sought to provide the airlines with a new generation of wide-body aircraft. All three firms expended massive amounts of resources on development, pre-production and tooling to be first on the market with a model that met airline's requirements. Timing is very important in the industry. Boeing won the competition, being the first on the market with the 747 [Ref. 4: p. 9], and they have maintained this leadership in the sale of wide-body aircraft. Competition continues for the sale of the current generation of aircraft, this time between Boeing, MDC, and Airbus. This generation of commercial transports, spurred by noise and pollution regulations, fuel prices, airline deregulation, and the need for increased capacity should provide a major expansion of demand for aircraft.

Boeing is the world leader in the development and assembly of commercial aircraft based on total sales. Primary products currently are derivatives of the Models 737 and 747 as well as the recent introduction of two entirely new aircraft, Models 757 and 767, which use advanced aerodynamics and technology, lighter materials and more efficient engines.

Douglas, recently concluded commercial production of the DC-10 aircraft and is planning to introduce a derivative of the DC-10, the MD-100, in addition to offering the DC-9 update, the MD-80 which was formerly known as the Super 80. Both aircraft use the latest in aerospace technology.

Lockheed is currently out of the commercial aircraft business, curtailing production of the L-1011 in 1981, although technical product and spare parts support will continue for years. Lockeed is currently completing production of the last units of the L-1011.

The Western European consortium, Airbus Industrie produces a twin-jet double-aisle aircraft known as the Airbus. Airbus Industrie is providing strong competition to U.S. manufacturers. The consortium is a joint venture of the governments of West Germany, Britian, France and Spain.

As with most large manufacturing endeavors, aircraft manufacturers are highly dependent on their suppliers and subcontractors in order to meet commitments to their customers. The suppliers and subcontractors are also in a highly competitive and risky business. The subcontractors work at the will of the prime contractor. Thus, they are affected by slow downs in the market, the aircraft manufacturer's make or buy preferences, product pricing, and investment decisions. Past performance is a critical element in future business. Problems with delivery or quality can cause a subcontractor to lose future orders. Recently sources of supply have been developed in Europe as well as Japan. During 1981, the U.S. exported more aerospace products than ever before, while the importation of aerospace products increased at a record rate [Ref. 1: p.6]. These imports are usually of high quality and provide direct competition to current U.S. aircraft industry suppliers and subcontractors.

D. THE AIRCRAFT MARKET

The U.S. aerospace industry, while having a strong sales year in 1981, showed declines in visible indicators of its economic health. In 1981, there was real sales growth in all sectors of the industry, except for commercial aircraft. Air carriers in the U.S., as well as in certain other parts of the world, failed to achieve earnings necessary to fund the new equipment required to modernize and expand their fleets. Backlogs of orders declined in real terms after

more than five years of growth. The drop in orders is viewed to have been caused by several factors:

a. The recession in the U.S. affecting both investment and travel,

b. High interest rates, making financing extremely difficult,

c. The poor financial status of many of the world's airlines, and

d. The increased competition by foreign aerospace manufacturers.

Competition occurs primarily on the basis of product suitability to the needs of the customer (a function of existing fleet mix, rate and route structure and other factors), product performance (including factors such as noise, fuel efficiency, maintenance costs), price, financing assistance and post-delivery product support. An author expressed his view of the marketing of aircraft:

> "Selling in the aircraft industry is done very differently from that in other product markets. Price turns out to play a resonably minor role in both commercial and military aircraft sales, whereas performance, maintainability, and most importantly, on-time delivery will often decide who reigns as the current king of the mountain or who drops out of the market entirely" [Ref. 4: p. 9].

Throughout this work, reference is made to various sizes of aircraft. Narrow body aircraft are usually single-aisle, with two, three, or four engines, capable of flying various routes. Wide-body aircraft are models such as the Boeing 747, DC-10, L-1011, and Airbus A-300. The wide-body model is usually double aisle, having three or four engines. The wide-body is usually used for long haul, high density routes, routes with relatively high passenger

traffic volume. Reference is also made to stretch models, such as some 727s, 737s, DC-8s and DC-9s. These are enlarged narrow-body aircraft, with stretched fuselages and higher thrust engines.

E. THE PRICE OF AIRCRAFT

Manufacturers devote a great deal of time and money to the design and tooling necessary for the introduction of a new model aircraft. This effort and expense is an investment made prior to the sale of any aircraft. The price of a commercial aircraft is driven not only by the actual cost of assembly, but also, by factors such as possible future demand, the competitor's actions and what the airline calculates is the potential return on their necessary investment. Before establishing the price of the aircraft, the manufacturer must carefully establish what the likely future demand for the aircraft model will be. If the price is established too low, an unattainable number of planes would need to be sold to reach at least a break even point. If the number falls short of the projected quantity, the project would not succeed, and as the Lockheed L-1011 experience shows, large losses would follow. Acting on the manufacturer's evaluation of expected sales is the existence of various levels of competition among the sellers of aircraft. All manufacturers want to sell aircraft and keep production lines open. The established price must consider both the buyer's view of the market, as well as the cost to assemble the aircraft.

The existence of the learning curve phenomenon presents certain decision making information to the manufacturer when determining the sales price of an aircraft. The learning curve relates the unit cost of airframes to the cumulative number of units produced. The learning curve is a widely held explanation of production unit cost behavior. As each

successive unit is produced, techniques such as the order of assembly, or the need to consult drawings, or the application of materials, become more refined, and the kinks are worked out of the assembly process. The result is an increase in efficiency in the assembly process for that particular airframe. A commercial aircraft is typically sold on a fixed price basis. Although initially the price may not equate to the actual cost of production (cost may exceed price), there is obviously a great deal of pressure to move down the learning curve, reducing costs below the established price. This is accomplished by selling quantities of aircraft. U. S. manufacturers do not generally build aircraft without orders in hand.

Quantity decisions made by the initial purchaser of a model affect the price of follow-on orders. The seller knows the cost to manufacture an aircraft and seeks to sell as many units as possible to an airline, offering considerable concessions on this initial order. Concessions can be based on elements of the contract, such as price, delivery, or product support. This initial order allows the manufacturer to begin production and commence moving down the learning curve.

As can be seen, there is a great deal of risk in this business. Designing and tooling-up for the production prior to a sale, determining the initial sales price, and dealing with the competition are not necessarily unique to the aircraft industry. What is important to keep in mind is the exceptional size of the financial risk and uncertainty inherent in the aircraft industry.

III. THE MAJOR U.S. COMMERCIAL AIRCRAFT MANUFACTURERS

A. INTRODUCTION

In this chapter a review will be made of the three U.S. manufacturers of large commercial aircraft, including a brief familiarization of each of the three firms, an examination of the product lines on which the industry contract is based, and recent product developments by the firms.

The commercial aircraft industry is led by Boeing, which produces a family of aircraft to meet the broad demands of its customers ranging from twin-engine aircraft (102 seats) to a four engine, two-aisle wide-body aircraft (up to 500 seats). Boeing has recently introduced new models as well as more efficient derivatives of mature models. McDonnell Douglas has, in the recent past, limited its product line to essentially two models, a wide-body model and a narrow-body twin-engine model, updating these models to conform to current market conditions. These two firms are actively marketing their products throughout the world, using innovative business techniques, to deal with the uncertainty and risk of the marketplace. The third U.S. commercial aircraft manufacturer Lockheed, is concluding production of its commercial aircraft. After experiencing losses of $2.5 billion, the firm decided to no longer compete in this sector of the market. Lockheed will continue to support the aircraft it has produced throughout the life of the aircraft. Because Lockheed has been involved in the manufacture of aircraft and has contributed substantially to the

basic structure of the standard industry contract, it is included in this review.

Airbus Industries, a fourth manufacturer, is making a profound impact on the industry. Airbus Industrie is owned by Aerospatiale of France and Deutsche Airbus of Germany (thirty-eight percent each), twenty percent by British Aerospace and four percent by CASA of Spain. [Ref. 5: p. A 24]. This Western European consortium has developed and produced various models of twin-engine, 200 and 250-passenger aircraft. There is a great deal of national pride and prestige associated with the success of the European aircraft. They have been aggressive in attempting to obtain an increasing market share for the aircraft, both in the U.S. and throughout the world. Assumption of risk by the national entities allows Airbus to operate in a different environment than their U.S. competitors. The policy of the conglomerate allows it to build aircraft without firm orders in hand, and adjustment of sale price more freely in marketing the product. Additionally, because they are government backed, Airbus is able to offer lucrative financial concessions to buyers, in order to stimulate sales. This resulted in their recently selling aircraft for $40 million [Ref. 6: p. 51], approximately thirty percent less than originally priced. While Airbus Industrie has had a definite impact on the aircraft manufacturing industry, contract issues in the sale of Airbus' products are not included in this work. Their contract is based on French commercial law and was not readily available to this author. Therefore, their contract does not form a basis for the discussions on the industry contract found in later chapters.

B. THE BOEING COMPANY - BOEING COMMERCIAL AIRPLANE COMPANY

The Boeing Company, together with its subsidiaries, is one of the major aerospace firms and the major supplier of commercial aircraft to the world market. Boeing operates principally in two industry segments, transportation equipment, and missiles and space. Transportation equipment operations are concerned with the development, production and marketing of equipment and related support services to both commercial and military customers. In addition to aircraft, other types of commercial transportation equipment produced by Boeing include helicopters and hydrofoil watercraft (jetfoils). Missiles and space operations are primarily concerned with research, development and production of various strategic and tactical missiles and space exploration products. The company's operations are conducted through four principal divisional companies:

a. The Commercial Airplane Company,

b. The Aerospace Company,

c. The Military Airplane Company, and

d. The Vertol Company.

Boeing Commercial Airplane Company offers a wide range of commercial aircraft designed to meet a broad spectrum of passenger and cargo requirements of domestic and foreign airlines. This family of aircraft currently includes the standard-body models 727, 737, and 757 as well as the wide-body models 747 and 767. With deliveries of the new generation 757s and 767s accelerating, and with the advanced technology and larger capacity 737-300 coming on line in 1984, production of the twin-jet model 727 is scheduled to end in mid-1984, with a total of 1,832 units having been produced. Sales of the 727 amounted to more than $20

billion since its introduction in 1964. It will be replaced by the model 757, which can carry 185 passengers at substantially less cost than the 727 can transport 145 passengers [Ref. 7: p. A8]. Sales of the model 737 twin-engine jet recently reached 1,084 units. Boeing was the first manufacturer of a successful jet-propelled commercial airplane, the model 707, which entered service in 1958. The timing of the entry provided Boeing the opportunity to establish dominance in the manufacture of large airframes. Boeing has had its problems. The initial model 747s experienced engine problems, which caused operational failures and delays with deliveries. Both cash flow and the reputation of the company suffered. Layoffs in the Seattle, Washington area caused deep business, economic, and social problems. By taking economy and efficiency measures in their manufacturing and management processes, Boeing was able to sustain itself, recover and grow.

During 1982, announced new orders for Boeing's commercial jet transports represented forty-nine percent of all free-world commercial jet transport new orders and forty-eight percent of all the free-world dollars committed to such airplanes for the year [Ref. 8: p. 5]. Of announced orders for 110 jet transports in 1982, fifty-two percent were from foreign customers. As of December 31, 1982, foreign orders comprised approximately forty percent of Boeing's commercial jet transport unit backlog. The backlog of firm, unfilled commercial orders as of that date were $14,040,000 down from $15,000,000 at the same time the previous year [Ref. 8: p. 4].

During the past five years Boeing has invested over $3 billion in research and development and $2.4 billion in new plant and equipment to improve productivity in both military and commercial programs and to develop derivative and new commercial products such as the models 757, 767, 747-300 and

737-300 [Ref. 10: p. 5]. The research and development costs have been expensed, a conservative Boeing custom. These costs were $1.3 billion for the new model 767 alone. The introduction of the two new aircraft was moderated by concern over the financial problems of the airline industry which have adversely affected the market for commercial aircraft. The standard price for the 767 is $46 to $52 million and for the model 757, $36 to $42 million per aircraft.

In an effort to reduce its risk in the development and production of the 767, Boeing has established a consortium to manufacture components for the aircraft. Manufacturers involved in this consortium are located in Japan and Italy, in addition to the United States. Type certification of the model 767 as to conformance with the Federal Aviation Administration's (FAA) Regulation was accomplished after more than 1,600 hours of developmental flight testing and FAA trials. Extensive fuel-consumption experience developed on the 767 verified Boeing's prediction that the new airliner will use forty percent less fuel per seat than the aircraft it is designed to replace. The 757 and 767 were designed with increased use of non-metallic material. The 757, for example, uses 3,350 pounds of graphite-epoxy and kevlar-epoxy panels. If traditional materials were used instead of these space-age composite materials, the empty weight of the airplane would have been approximatley 1,500 pounds more [Ref. 10: p. 7].

John Newhouse, in *The Sporty Game*, noted that. . .

> "Boeing's chief competitive advantage lies in its unique ability to offer a large and growing assortment of airplanes, wide-bodies or narrow-bodies some with two, three or four engines" [Ref. 9: p. 7],

and also,

> "It (Boeing) blends a cautious, vigorous attitude toward money with a boldness and confidence that shape its business decisions. Its major weakness may be an overconfidence in its strength combined with too little tolerance for problems beyond the perimiter of its immediate affairs" [Ref. 9: p. 138].

C. MCDONNELL DOUGLAS, INCORPORATED - DOUGLAS AIRCRAFT COMPANY

McDonnell Douglas Coporation (MDC), was formed in 1967 from the merger of McDonnell Corporation and Douglas Aircraft Company. The firm is engaged in the fields of high technology aerospace products, space systems and missiles. MDC has six principle divisional companies and three principle subsidiary corporations. The principle divisional companies include Douglas Aircraft Company (DAC) which is engaged primarily in design, development and production of both commercial and military transport aircraft. Douglas was the leading manufacturer of piston-driven aircraft. It introduced the DC-3 in 1938, monopolizing the world commercial air transport field for decades. Douglas' introduction to the jet transport era with the DC-8 was not considered a success, primarily because of timing. It was introduced one year after introduction of the successful Boeing 707. MDC, through its Douglas Aircraft Company division, has most recently produced the DC-9 and DC-10 commercial transport aircraft for sale throughout the world.

During the period 1973-1982, based on the dollar volume of orders booked, MDC ranked third among U.S. and Western European manufacturers of commercial jet transports. MDC's annual percentage of total new bookings received during that period varied from 6.9 percent to 34.6 percent of the total aircraft market and averaged 18.5 percent. During 1982, MDC received an estimated $.91 billion (excluding 35 leased

DC-9), or approximately 22.5 percent of the total net bookings of $4.1 billion for commercial world-wide orders [Ref. 11: p. 4].

A strategy at MDC for the design and development of commercial aircraft is to improve operating and manufacturing efficiencies on its current models rather than introducting entirely new models. The DC-9 is a twin-jet, short-to-medium range transport designed to operate efficiently on relatively short routes. Nearly 1,200 DC-9s have been ordered during the life of the design. The MD-80 models are currently in production. MDC feels that this is the aircraft of the future. The aim with the MD-80 is to improve efficiencies and push down costs without introducing radical changes.

The DC-10 is a wide-body tri-jet aircraft designed for both medium and long-range routes. Due to variances in the market place, impaired sales, adverse publicity and temporary grounding by the FAA as the result of several aircraft crashes, MDC decided in mid-1983 to discontinue production of the commercial version of the DC-10 aircraft. (It will continue to produce the KC-10 tanker/cargo version for the U.S. Air Force.) In its place, MDC will introduce a derivative model, the MD-100. It is designed to move medium to high capacity loads over long-haul routes. This model is sized between the Boeing 767 and 747 aircraft, on the grounds that the aircraft will offer better range flexibility than the 767 on medium capacity routes and more efficient size than the 747 on long range routes [Ref. 12: p. 27]. The MD-100 will include a family of models, seating 270 to 387 passengers and offering 5,600 to 7,000 miles of range, with extended versions still under study. Type certification is expected in early 1987. A key to the development was the availability of new engine models from both Pratt & Whitney and General Electric, giving the plane

improved performance and efficiency above that available in current engines.

As noted above, the world-wide air transport industry remained severly depressed througnout 1982 because of adverse economic conditions and, in the U.S., the effects of deregulation of airlines. Many airlines sustained heavy losses in 1982 and are finding it increasingly difficult not only to order new aircraft but also, in some cases, to be able to take delivery of jetliners already on order. In adjusting to this situation, MDC concluded agreements to deliver 35 DC-9s under short term operational leases to Trans World Air Lines (TWA) and American Air Lines. This approach, though purposely limited to only two customers, has accomplished three important objectives, from MDC's point of view:

a. It provides a way of getting new jetliners into service despite the financial difficulties of airlines, providing MDC a more efficient MD-80 production rate. It should be noted that American Air Lines cancelled their order to purchase Boeing 757s after arrangement of this lease with MDC [Ref. 13: p. 19].

b. By placing the MD-80 with American and TWA (the world's third and fifth largest airlines respectively), advantages in fuel efficiency, noise control and passenger appeal would by recognized by other potential customers.

c. The action will focus attention on the MD-80 as an economical alternative in the 150-passenger seat class. Expanded use of the MD-80 is calculated to make an all-new aircraft seem less attractive to airlines around the world [Ref. 11: p. 3].

The lease approach involves risk. The leases run for five years, after which they can be renewed for thirteen years. There exists the possibility the aircraft involved could be returned at a time when they might not be easily sold or released to other airlines. MDC believes the risk is outweighed by the opportunities the strategy opens up. The agreement with American calls for MDC to share in the airlines' profits above a certain level [Ref. 3: p. 43]. It is reported that an investment of about $700 million over the next two years will be required for the leases, with one fourth of the amount coming from suppliers. The riskiness of the leases, based on the fact that the airlines made no down payment and can merely return the planes on thirty days notice, was reflected by Standard & Poor's Corporation's (S & P) giving consideration to the possible reduction of MDC's credit rating. S & P subsequently took no action, however. [Ref. 14: p. 4].

This type of lease is attractive to those airlines that need efficient planes but cannot afford to pay for them. MDC feels that American Air Lines will, after five years, have paid between twenty-five and forty percent of the cost of the aircraft and MDC will have depreciated the planes to less than market value. The leased aircraft were delivered on turn-key operational leases, and included pilot and crew training as well as spare parts. The two airlines will maintain the aircraft to the normal airline standards.

D. LOCKHEED CORPORATION- LOCKHEED CALIFORNIA COMPANY

Lockheed is a major designer and producer of technologically advanced defense systems and equipment. It is principally engaged in the research, development and production of military aircraft, missiles, spacecraft, electronic systems, aircraft services, ocean vessels and until

recently, production of commercial aircraft. Commercial aircraft were manufactured by the Lockheed California Company. A fast growing part of Lockheed's business is the overhaul, maintenance, and servicing of aircraft, space craft and electronic installations.

Programs for the U.S. government, most of which relate to national defense, accounted for eighty percent of the company's 1982 sales. Sales to foreign governments amounted to fifteen percent. Sales to commercial customers made up the remaining four percent.

Lockheed stayed out of the initial jet transport competition fought between Boeing (707) and Douglas (DC-8), targeting the market instead with a turboprop, the Electra, which initially faltered because of flight-handling problems. After rectification of these design problems, the aircraft became a success despite being the last large prop-driven aircraft to be introduced as the jet-age began. (The turboprop is still being manufactured and is used by the U.S. Navy and its allies as the P-3C patrol craft.)

Lockheed decided to stay out of the jet competition, but was drawn into the commercial aircraft market with work on the Supersonic Transport (SST) program. Attempting to participate in the wide-body era, Lockheed entered the competition with a tri-jet wide body aircraft, equiped with Rolls Royce engines. Competing directly with Douglas, Lockheed introduced the L-1011 in 1968, while Douglas was introducing the DC-10. Initially the aircraft had similiar length, width, wing-span, capacity, range, speed, engine-thrust and seat mile costs. Both manufacturers granted large concessions to airlines for orders. It was a destructive competition for both aircraft manufacturers. Although the L-1011 was viewed as the technically superior aircraft, it was the victim of a soft airliner market, and questions from prospective buyers regarding the reliability of its

Rolls Royce engines. The cost of a new L-1011 was approximately $35 to $40 million. Late in 1981, Lockheed announced that production of the L-1011 Tristar commercial jetliner would be phased out by early 1984, after 15 years and $2.5 billion in losses. Because of depressed market conditions, there appeared little likelihood of achieving economic L-1011 production levels before 1985. The finanical consequences of attempting to sustain production at low levels in anticipation of a market upturn made it necessary to begin phasing out production. Lockheed, at the time of announcing the phase-out, reassured customers that it will fulfill its contractural commitments relating to spare parts and support services. During 1982, Lockheed delivered 14 TriStars. Five units are currently completing production without firm orders. Completion of the five unsold aircraft was considered advisable for the efficient and economic phase-out of the program. Lockheed has indicated that it would consider reentering the commercial transport market only as a subcontractor or as a participant in a consortium. [Ref. 5: p. A 24].

IV. THE COMMERCIAL AIRLINE INDUSTRY

A. INTRODUCTION

In this chapter an overview of the airline industry along with factors which influence the demand for aircraft will be examined.

There are a number of factors which cause airlines to purchase aircraft. In addition to retirements due to age, advancements in technology also cause aircraft to become obsolete. Regulations such as the Noise Control Act of 1972 and the deregulation of the airline industry will require aircraft to be replaced prior to full service. Both of these regulations will be examined in this chapter. Airlines continually strive to obtain the largest return on their investment in equipment. The largest elements of their operating costs are currently fuel and labor. Airlines are making attempts to control the cost of these elements. Countering these cost-control efforts, downward pressure on revenues has increased recently due to the deregulation-generated entry of competing airlines into the market, as well as the ability of the airlines to set fares. Widespread fare competition between airlines has increased pressure to operate the most efficient equipment, but also has caused the revenues in the industry to drop significantly.

The airline industry has, since its inception, been a highly competitive, intense, risk-oriented business. Early airlines in many instances were created and run by expansive

thinking, daring entrepreneurs, many with engineering as their area of expertise and primary interest. These airline pioneers derived self-satisfaction from growth, rather than from profit. The size of the airline fleet was an indication of their success. The airline industry has been a growth industry over the past three decades.

The airline executives of the 1980's are, in many instances, more business oriented, striving to make money in bad times as well as good. Today's airline manager is concerned with such factors as yield, load factors and return on investment. The great financial outlays for aircraft and ground equipment, the continual efficient use of this equipment, and the dealings with the myriad of investment, legal and governmental impediments would cause the early pioneers to find frustration or perhaps fail in the industry of today. Carrier demand is interrelated with a number of factors heavily influenced by elements not within the control of the airlines. Incidents such as the increase in the price of fuel, deregulation of the airline industry, and the emergence of international competition are recent challenges facing the airline owners and managers. These events have had profound effect on individual airlines as well as the industry as a whole.

B. THE AIRLINE INDUSTRY

In 1981, the U.S. scheduled airline industry experienced the worst financial losses in its history. Overall operating costs remained high despite some stabilization of fuel prices. Airline deregulation contributed to excessive fare and route competitions and subsequent reductions in revenue. The recesssion in the U.S. caused a reduction in both business and leisure travel [Ref. 1: p. 77]. U.S. carriers, including operators other than scheduled airlines, were

flying 3,973 aircraft as of 31 December 1981, an increase of 168 planes over 1980. Worldwide commercial air travel experienced a drop in passengers, while air cargo ton-miles edged up slightly [Ref. 1: p. 78]. The following sections will discuss certain elements of the industry which affect the environment in which the airlines operate and which generate demand for specific aricraft capabilities.

1. Demand for Aircraft

Because of the advanced age of many of the airlines' fleets, about forty percent of the total fleet will probably need to be replaced in the 1980s. There are large variances in the estimates of the potential demand. Standard and Poor's Corporation estimated that if all planned programs are realized, as much as $30 billion to $40 billion will be spent on equipment in the next decade [Ref. 15: P. A 60]. Similarily, Boeing forecasts industry-wide sales at 4,400 new aircraft to be sold during the period 1983-1993, forty-three percent of these long haul models, with a value of $167 billion at 1983 prices. [Ref. 6: p. 59]. Projections of the world commercial aircraft market for the coming decade remain high; the need for new and replacement aircraft has not diminished, only the airlines ability to pay.

International airlines provide a great deal of competition to the U.S. carriers, vying for passenger traffic throughout the world. It is expected that international carriers will account for more than half of future commercial aircraft sales. Most international carriers are national airlines receiving financial backing from their governments such as subsidized export credits to purchase aircraft and support equipment.

There is much conjecture regarding the eventual equipment mix of airlines. Several forces are propelling equipment replacement decisions:

a. The needs of the airlines to respond to rising operating costs,

b. The likelihood that passenger and cargo traffic will continue to grow over an extended period,

c. Increasing obsolescence of elements of the existing fleet, and

d. Marketing ability of airlines to attract passengers.

Airlines are insisting that trade-ins now play a greater role in the purchase of new aircraft. While this is not a new procedure, the volume of aircraft used as trade-ins has required the manufacturers to devote a greater share of their sales efforts to marketing these assets. Aircraft manufacturers are now taking as trade-ins, models other than their own, as well as selling these used aircraft. This is a recent change in their sales strategy. One source estimates that thirteen percent of the world's large aircraft are for sale. The manufacturers are well suited to market the aircraft, with their world-wide sales forces and contacts throughout the marketplace. The manufacturers have recently found it necessary to creat divisions or departments to market the used aircraft. An important sales point for the buyers of the used aircraft is that the manufacturers have agreed to support their own aircraft, regardless of which manufacturer sells the craft. [Ref. 16: p. 25]. The benefits to an airline of purchasing used aircraft are that they are usually less expensive than new aircraft, and that they are immediately available. Boeing 737 and Douglas DC-9, smaller twin-jet aircraft, are

currently in demand by the deregulation-generated airlines because they are fuel efficient, are operated by only two pilots, and they easily fit into planned markets.

When introducing a new model, the manufacturer actively promotes the aircraft, attempting to generate sales by offering special concessions to the first purchaser, referred to as the launch customer. The manufacturer is willing to make these concessions because he needs these initial sales in order to commence production. Before placing an order, an airline must analyze its requirements and decide whether to purchase aircraft in order to expand capacity or retire less efficient aircraft. Other possible decisions are to investigate the used aircraft market or to postpone the purchase entirely.

Once deciding to purchase new aircraft the strategy of the airlines is influenced by projections of operations, aircraft acquistions, aircraft employment and retirement, what productivity will be, and how aircraft purchases can be financed. Manufacturers assist airlines by taking an active role in this strategic planning. The productivity of an aircraft is based on its flights per day and seating configuration. The percentage of seats occupied on a given flight, termed load factor, is used as a basic measure for profit and loss. The higher the load factor, the higher profitability. Potential load factors are a primary consideration of airlines seeking new equipment, although more emphasis is now being placed on yields, or revenue per passenger mile. If the size of an aircraft is increased, airlines expect to have lower operating costs; as the number of people carried increases, the cost of transporting each passenger (passenger seat mile) goes down, provided that enough seats are actually filled. It is said, that traffic equals profit. For each one percent increase in traffic, $350 million a year in additional revenue is generated

[Ref. 6: p. 51]. As noted above, airlines need to replace equipment. The ability to purchase new aircraft is dependent on achieving increases in revenues.

2. Fares and Marketing

Airlines need adequate fares together with passenger seat miles to maintain their yields or revenue per passenger mile, an industry-wide measure. The industry yield was 11.76 cents per passenger mile in 1982, compared with 12.35 cents in 1981, which was also considered a poor year. In addition to entry and route structure changes, deregulation allows a free market environment for fare setting. Airlines in the recent past have had to slash fares to remain competitive with other airlines, as well as attempt to increase passenger seat miles flown. Seventy-eight percent of the revenue passenger miles flown in the U.S. in 1982, were fare discounted, up from seventy-one percent in 1981, and fifty-seven percent in 1980 [Ref. 17: p. 4].

Deregulation eliminated the national fare structure which had existed prior to the act. Severe price competition reflected in widespread fare cutting by airlines has diluted yields and retarded revenue growth. The fare reductions are used as a tool to attract traffic. In light of the current environment airlines have reduced fares for a number of reasons:

a. A new airline attempting to gain a foothold in an existing route,

b. An established airline expanding out into a new territory or otherwise responding to the new competition and seeking to attract traffic, and

c. An airline in severe financial straits attempting to

obtain cash to maintain debt repayments [Ref. 15: p. A 46].

Airline marketing centers around determining the needs and wants of existing and potential passengers. The fare for air travel has been set by a marketing strategy, as it acts as an effective tool to increase market share. In addition to fares, airline promotions usually deal with the airline's schedule, type of aircraft or services available. Another marketing tool is the reservation system. The recent fare discounting and route restructuring by the airlines has put pressure on these organizations to provide up-to-date information on fares, schedules and services. Prior to deregulation, schedule was the aspect of service which generated market share. In the post-deregualation environment a combination of fares, schedules and type of aircraft are the important forces driving share. The marketing element of airlines are becoming the dominate force in their management, with engineering and finance taking a back seat. Frequently equipment decisions are based on marketing factors. [Ref. 9: p. 83]. There is a bandwagon effect among the airlines; they have to have the best and latest equipment to offer potential passengers, perceiving the additions will add prestige to the airline. This effect is limited by the airline's ability to pay for the equipment.

3. Regulatory Environment

The Airline Deregulation Act of 1978 substantially amended the Airline Act of 1938. The earlier act established the Civil Aeronautics Board (CAB), its policies and authority. The CAB encouraged and assisted in developing the air transport industry, as well as providing protection against unfair and competitive practices. Among other

things the 1978 act provides are unlimited freedom of entry into and exit from domestic routes, ease of entry into the industry for new carriers, allowing airlines to set fares, and ensuring continued air service to small communities. The act was aimed at providing better service at less cost to flyers, allowing the laws of competition to dictate strategic decisions by the airlines.

Despite the passage and implementation of the Airline Deregulation Act, air transportation is still subject to extensive federal regulation. The Federal Aviation Administration (FAA) provides discipline and guides flying operations generally, including control of navigable air space, flight personnel, aircraft certification and maintentance. The CAB deals with fair trade, consumer protection and antitrust matters. The National Transportation Safety Board (NTSB) investigates accidents involving aircraft.

A key to operating efficiency under deregulation is the ability to shift to profitable routes. It has been shown that greater aircraft utilization rates or average hours flown per day per aircraft, can be achieved by establishing hub and spoke route systems. By setting up numerous incoming and outgoing flights from one central hub, a carrier can improve load factors by creating a feeder system whereby passengers fly into the airline's hub and then are fed to outgoing flights on their way to final destinations. From the hub operator's point of view, hopefully on the same airline. The hubs are centers of airline activity and may include the airline's adiminstration offices, maintenance center, and home port for flight crews. The hub and spoke system generates increased demand for smaller short-to-medium haul aircraft that would not be economical on either short-spoke or long-haul routes.

The Noise Control Act of 1972 empowered the FAA to establish comprehensive noise regulations and standards applicable to aircraft manufacturing and operations. In late 1976, the FAA issued regulations requiring the phased compliance of existing aircraft with strict noise limits. These regulations were applicable to new aircraft as they were introduced. Four engine commercial jet aircraft need to comply by 1 January 1985, three engine craft by 1987. A small community service exemption provides for relief for small (two engine) jets with certain stipulations. Compliance with the regulation has required the airlines to make expensive acoustical modifications or re-engining of certain aircraft models at various levels of expense. One airline observed that the modifications produce reduced aircraft efficiency and operational performance by adding to aircraft empty weight and increasing fuel consumption [Ref. 18: p.4].

4. Fuel

Another factor which has placed demands on the airlines for fleet modernization is the cost of fuel and the desire to control cost per passenger mile by employing fuel-efficient equipment. Historically each new generation of aircraft has lower operating costs. Fuel costs account for a large portion of an airline's operating costs. In 1973, airlines paid eleven cents per gallon of fuel or about twenty percent of their direct operating costs. By 1980 the cost of fuel exceeded $1.00 per gallon, absorbing over thirty percent of the airline's direct operating costs and was thus a major source of downward pressure on airline's profits in the 1970s. A one cent drop in fuel prices translates into an annual savings of about $100 million for the industry as a whole. During 1982, fuel prices stabilized and declined slightly.

As an example, during 1982, Delta Air Lines used 1,078.4 million gallons of fuel, at a cost of $1,078 million, or 27.9 percent of its operating expense, down from 31.9 percent in 1981 [Ref. 19: p.6]. During the same priod, United Air Lines used 1,290 million gallons of fuel at a cost of $1,290 million or 27.1 percent of operating expenses, down from 28.7 percent in 1981. [Ref. 20: p. 4]. Airlines have generally projected declining fuel costs for the immediate future.

5. Capacity

U.S. airlines, after a profitable period in the mid-1970s, began to re-equip, an action which had been postponed for years. Nineteen seventy-seven was a good year, with upward trends in aircraft passengers and freight. Airlines predicted continued growth. They sought out the most technologically advanced equipment and placed substantial orders.

As a result of these purchases and the subsequent drop in air travel, there is currently overcapacity in existing fleets as well as an excess supply in the used aircraft market, primarily in long-haul wide-body aircraft. It is estimated that ten percent of the wide body fleet is for sale in the used aircraft market. The price for used narrow body aircraft has fallen also [Ref. 15: p. A 26]. Some airlines expect to get a higher return on investment by purchasing late model, readily available, used aircraft at discount prices than by taking delivery of a more expensive new aircraft.

6. Labor

The adverse operating environment prevailing in the early 1980's forced the industry to take a close look at costs. They sought to improve operating margins by

increasing the productivity of the labor force. Layoffs were instituted, along with wage freezes and reductions in exchange for profit sharing and stock ownership. Although labor costs as a percentage of total operating costs declined to thirty-five percent in 1981, down from forty-six percent in 1971, the cost of average wages and benefits per employee more than tripled to $37,000. Unions appear to realize both the threat of worsening financial conditions of the major airlines and the need to improve profit margins. Changes in work rules aimed at raising productivity have been negotiated.

7. Finances

Currently the key to aircraft sales is the financing package. Orders are being booked on terms manufacturers would not consider in good times. For example, Eastern Air Lines' selection as the launch customer for the Boeing 757 took an extraordinary effort by both lenders and the manufacturers of the aircraft and the engine (Rolls Royce) [Ref. 13: p 19]. Eastern, although regarded as a financially overextended airline, has assumed an aggressive strategy in seeking profits. They are apparently relying on fuel efficiency and the marketing effects of a new aircraft to help them pay for the craft. Recently Boeing, as well as the other manufacturers, have had the pressure of European political and business strategy, namely Airbus, to contend with and were thus amenable to favorable fianacial terms for Eastern.

Airlines are insisting that trade-ins are a part of the purchase package. Because manufacturers are determined to sell the new models, such as the 757s and MD-80s, they are more responsive to such demands. While trade-ins are not a new part of the sales process, the volume of trade-ins has increased, thus pressuring the manufacturer to move the used units as well as continue to sell the new products.

In addition to new equipment, airlines need funds for debt retirement and payment of dividends to stockholders. Currently the bulk of the external financing is capital leasing and debt. Since August 1982, the airline industry has raised nearly $1 billion from the sales of common and preferred stock and convertable debt instruments. Leasing promises to continue to be a major source of financing of new aircraft, particularly advantageous for carriers with weak balance sheets. Another incentive to the use of leasing arrangements is the ability enabling airlines to use investment tax credits. This incentive was offered by the Safe Harbor leasing provision of the Economic Recovery Tax Act of 1981. In addition operational leases, such as those created by MDC, there is a large market for third party leasing. Companies purchase the actual aircraft and lease to the airline, receiving the investment tax credits as well as depreciation benefits. Recently foreign banks and commercial concerns became actively involved in this type of investment transaction.

American Air Lines' Senior Vice President and Treasurer, John Pope, reflected on the operating leases that American and TWA entered into with Douglas:

> "In the future, aircraft manufacturers must assume more of the ownership risk and must work harder to control their costs in an effort to produce a product that is more affordable" [Ref. 13: p. 21].

John Pope is considered to be one of the most innovative financiers in the airline industry. His views most likely reflect the views of the airline industry and place additional pressure on the manufacturers. The industry fells that the cost of aircraft are so great that only with manufacturer's participation and the availability of creative financing schemes, will they able to afford to purchase

aircraft. The opposing point of view is that if airlines can get their costs under control while eliminating their recent detrimental competition for market share, they might be in a better position to finance aircraft purchases by conventional means.

V. CONTRACT ISSUES IN THE SALE OF COMMERCIAL AIRCRAFT

A. INTRODUCTION

As can be seen from the previous chapters, the aircraft manufacturing business is complex, dynamic and a costly environment in which to operate. The industry is characterized by intense rivalry and uncertainty. There is also a good deal of risk in the commercial aircraft business. The aircraft manufacturers strive to develop and produce an airplane which provides the latest refinements and fills the needs of the marketplace. They attempt to sell as many of the aircraft as possible, seeking the break even point. The airlines prefer to deal with two or three manufacturers in order to avoid becoming captive to any one of them. Their ability to make the necessary huge capital outlays is limited by many elements over which they have no control. The contract for an aircraft is the document used to allocate risk among the parties to the transaction. This chapter will present a look at the formulation of the contracts in use throughout the industry, the particular policies and procedures applied in the industry to manage the contract, and the practices used in the industry to proceed from identification of a prospect to the reaching of an agreement. The points offered throughout this chapter are viewed by the author as general industry practices. The term industry contract used here, refers to a permutation of the contracts and contract articles in use by the three U.S. manufacturers.

B. CONTRACT FORMULATION

The following sections present an examination of various points upon which contracts for aircraft are commonly based. Several features distinguish contracts employed throughout the industry from contracts used in other business enterprises. Pro forma or standard contracts have been developed by manufacturers and can be modified by employment of a unique instrument called a side letter. Contracts for most business transactions in the United States are based on the Uniform Commercial Code, the use of which promotes uniformity under the laws applicable to business transactions. Aircraft are built in accordance with a specification which includes performance expected of the craft. The Federal Aviation Administration (FAA) certifies the airworthiness of the craft for its intended purpose, based on review of the specification, the assembly process, and a flight inspection. Other topics discussed in this section, include interface agreements, buyer furnished or designated equipment, and service life policies, which the buyer will use throughout the life of the aircraft.

1. The Contract

In the aerospace industry, the term contract, sales agreement, and purchase agreement are used interchangeably. The provisions of a contract for an aircraft are based on the Uniform Commercial Code (UCC) [Ref. 21], which is the legal code guiding commercial transactions in the United States. Because the UCC is, in a sense, the regulation for the sales contracts of aircraft, a further explanation of the Code will be provided below.

In this chapter, the author refers to the document used in the industry as being a contract because this is the legitimate term and also to provide a sense of continuity

throughout the chapter. In the UCC, Section 1-201(3), agreement is defined as:

> ". . .the bargain of the parties in fact as found in their language or by implication from other circumstances including course of dealing or usage of trade or course of performance as provided by the Code."

On the other hand in Section 1-201(11), contract is defined as:

> "The total legal obligation which results from the parties' agreement as affected by the Code and any other applicable rules of law."

Agreement is thus used by the Code to describe the process, such as negotiations through words or acts, resulting in the parties reaching a bargain, in other words a meeting of the minds. It has a much broader meaning than the term contract. A contact flows from this bargain and lays down the legal obligations of each of the parties under this bargain. It may be oral or written and is the legal relationship regarding the rights and duties of the two parties to the bargain. In this chapter, the term, basic contract will refer to the initial contract entered into by the two parties. This is not a type of contract, but is only a phrase to indicate the contract which was created from the initial agreement to purchase or lease aircraft. Elements of this basic contract may be changed by amendment, modification, or by a form of agreement called a side letter. Side letters will be discussed in Section 4, below. The basic contract as well as amendments and modifications are required to be filed with the FAA.

2. The Uniform Commercial Code

The Uniform Commercial Code (UCC) [Ref. 21] is the result of a project commenced in 1938 by the National Conference of Commissioners on Uniform State Law and the American Law Institute and was the first effort to promulgate a comprehensive act covering the entire field of commercial transactions. Various drafts and revisions were published from 1952 through 1957. The result was the publication of the Code under the title "1957 Official Edition." The latest edition of the Uniform Commercial Code is known as the "1962 Official Edition." It must be realized that the exact interpretation of the Code will not be found in the Code itself, but rather in the court decisions interpreting the Code [Ref. 22: p. 11].

The UCC, based on common law, determines the rights and obligations of the parties to a commercial transaction on the basis of fairness and reasonableness, in light of accepted business practices. The District of Columbia and each state of the union, except Louisiana, has adopted the Code. Louisiana has not adopted the Code because the state law is based on French Law, rather than English Common Law. The application of the Code by these jurisdictions provides some degree of predictability, although each state also applies a series of statutes affecting the Code's various sections. Each state's version varies to some degree from the 1962 Official Edition. The Code consists of ten articles dealing with the rights and obligations of parties in commercial transactions. Each article is broken down into sections and each section is followed by a comment. These comments, which vary in length from a single sentence to several pages, contain information dealing with the subject matter of the particular code section. [Ref. 23: p. 9]. Article 1, "General Provisions," states the purpose of the Code as follows:

> "To simplify, clarify, and modernize the law governing commercial transactions; to permit the continued expansion of commercial practices through custom, usage and agreement of the parties; and to make uniform the law among the various jurisdictions" [Ref. 24: p.23].

Article 2, entitled: "Sales," is the article which is applied in business transactions and around which the contract document for an aircraft is based. By and large, the Code is designed to aid in ascertaining the intentions of the parties to a contract, and when ascertained, that a contract was intended, give force and effect to the agreement. The code is transaction oriented rather than legal concept oriented [Ref. 24: p. 24]. Throughout this chapter, reference will be made to the Code with this author identifying the influence on articles or clauses of the industries' pro forma contracts. The scope of the Code also applies to transactions between parties where leases rather than sales transactions are conducted. When dealing with international airlines, U.S. aircraft manufacturers specifically state in the contract that the agreement is based on the laws of a certain state of the United States, invoking the choice of law within the UCC. The actions of the parties are thus governed by the UCC.

3. The Pro Forma Contract

The contract documents used throughout the industry are quite similiar among the major commercial aircraft manufacturers. Sections or clauses of the contract are referred to as articles throughout the industry. The content of the individual articles of the contract document vary to some degree, but similiar issues are covered either in a basic contract or exhibits or annexes attached to the basic contract. The contract for an aircraft usually consists of 200 or more pages, including the basic contract plus exhibits which detail support programs or product

assurances. Pro forma contracts are formulated by the individual manufacturers over a period of time and reflect their individual experiences, interests and desires for contractural coverage. Using the pro forma contract, manufacturers and their customers create pacts which are intended to last the life of the program. The price article is usually the only section of the pro forma contract updated regularly, because the base price of the aircraft is tied to the rate of inflation and arrived at by the application of certain formulas. The process used to establish the contract price will be examined in the next chapter. An incident or a crisis in the world affecting the airline industry can cause the attention of both buyer and seller to be shifted. An occurence such as the fuel crisis in the mid-1970's placed a great deal of emphasis on the performance guarantee provisions of contracts. Currently, financing elements of the contract have the spotlight.

When a manufacturer introduces a new model, he may at that time also introduce changes or refinements to the pro forma contract for that model. These alterations will be based on changes he believes the industry is expecting or has expressed a desire for. These changes may also be brought about to modify risk allocation or exposure. It is an innovative process. The manufacturers push each other by introducing contract articles or clauses which cause buyers to seek similiar contract conditions from the other manufacturers. Contract articles dealing with warranty, spare parts, and product support are areas currently being scrutizized by both buyers and sellers for change. The manufacturer is also sensitive to the interests of concerned associations or groups, such as the Air Transport Association of America (ATA), a trade association. Lobbying efforts by ATA as well as other persuasive associations and groups include informing the manufacturers what changes in

contract elements association members feel are in the best interests of the industry.

As found in most commercial sales contracts, the industry contract has provisions for contract modifications or amendments. The UCC, Section 2-209(1), provides that there is no requirement for consideration when modifying a contract. The industry uses no-cost modifications for some changes to terms or conditions of the contract. Of course, the nature of the change dictates the need for consideration, which would be negotiated between the parties. Modifications are commonly used, for example, to add aircraft or to change delivery schedules.

4. Side Letters

Signed contracts are required to be filed with the FAA and, as such, become a part of the public record available for scrutiny by any interested party, which certainly includes the competition. An instrument used throughout the industry to varying degrees is a form of agreement called a side letter. Side letters contain agreements which augment the contract and can, in fact, override an element of the basic contract. The actual side letters are simple bilateral letter agreements between the buyer and seller and are normally not filed as a matter of public record. They can cover any element of the contract as well as matters outside the contract. The agreements contained in the side letters are, in many instances, incentives in making the sale. They can make special concessions on the part of the manufacturer. A normal sales agreement for a large number of aircraft might contain as many as fifty side letters over the life of the program. The variety of side agreements is designed to lower the cost of the equipment to the airline. Examples of issues which could be the subject of side letters are monetary allowances on each aircraft, a credit

memorandum to be applied against the purchase of spare parts, options for additional aircraft at a specific price, grants for ground support equipment, or promotional agreements [Ref. 9: p. 54]. At one time elements of the currently used pro forma contracts, such as service life policy and warranty repair, were included in agreements as side letter issues. Individual manufacturers offered various levels of service or repair, continually attempting to entice an airline to purchase aircraft.

An indication of what type of agreements are reached and included in side letters is offered by the details of a recent sale. As a sales incentive, Airbus Industries provided Eastern Air Lines with an operating cost guarantee, compensating the airline for a proportional amount between the cost to operate the two hundred-forty seat Airbus A-300 aircraft purchased and the cost to operate an aircraft with one hundred seventy seats, which Eastern originally desired [Ref. 9: p. 56]. The contents of this side letter eventually became publically disclosed. The contents of most side letters are not so open to scrutiny.

5. Detailed Specification

a. Configuration

Aircraft are configured or built to a detailed specification. The specification for the manufacture of an aircraft includes a basic description of the aircraft, estimated performance criteria (range and speed), and certain weight criteria (gross weight). The internal components of the aircraft such as electrical, electronics and avionics characteristics, are also addressed. This is a baseline detailed-design specification to which the aircraft is built. From the baseline specification, a custom specification is developed for a prospective buyer, which also

includes any options desired. An airliner is normally tailored to the specifications of the manufacturer as well as to the unique desires of the customer. The manufacturer provides a list of standard options which can be incorporated into the aircraft with only minor changes to the specification.

b. Changes

Over the life of the aircraft model, the detailed specification may require modification for a number of reasons, such as change orders by the buyer and developmental changes created by the manufacturer. Change orders are created when the customer desires a variation to the baseline specification. Non-standard options, which are options not included in the option list offered by the manufacturer but requested by the customer, require engineering checks and balance evaluations prior to introduction into the aircraft model. If it is technically feasible, the option is developed and the customer is notified by Specification Change Notices (SCN) or Specification Change Statements (SCS), which are detailed descriptions of what is changed and the effects on the base price, weight, performance and scheduled delivery dates. SCNs and SCSs are terms used by manufacturers and are essentailly the same. Change orders amending the baseline specification are executed by mutual agreement of the buyer and seller.

Developmental changes are used to improve the aircraft, prevent delay, or insure compliance with the contract and may be initiated by the manufacturer without the buyer's consent if the change does not affect price, delivery, weight, or performance of the aircraft. The buyer will be notified by the manufacturer by issuance of a SCN or SCS, but there is no requirement for prior knowledge or mutual agreement.

6. Buyer Furnished or Designated Equipment

In the assembly of an aircraft for both domestic and international buyers, there may be certain parts, assemblies, or equipment which the customer prefers to provide to the manufacturer. The manufacturer takes delivery and installs the items. The reasons for a buyer to provide Buyer Furnished Equipment (BFE), also referred to as Buyer Designated Equipment, may be political, social, as well as economic, especially when dealing with foreign buyers. Seats, galleys, and lavatories are typical BFE. Many airlines prefer to negotiate their own contracts with the manufacturers of seats, for example. They perceive they receive a better price, they have interchangeability within their fleet, and they may purchase seats for other than the aircraft they are currently purchasing from the manufacturer. Timeliness of delivery of BFE orders and provision by the buyer to the manufacturer is very important. Tardy delivery would cause out-of-sequence assembly to be necessary, with the added cost passed to the buyer.

There are three basic methods used by airlines and the manufacturer for the provision of BFE:

a. Airline Places Order and Delivers Equipment.
The airline or buyer places the order, and the equipment is delivered by the customer to the manufacturer in accordance with a schedule for installation. The risk lies with the customer in meeting the necessary delivery requirements.

b. Airline Places Order Assisted By Manufacturer.
The buyer places the order for the equipment, and the manufacturer assists with general engineering coordination, quality control, inspection, and expediting of the shipment. The aircraft manufacturer and the customer share the risk.

c. The Manufacturer Places Order.

For a charge of twenty-five to thirty-five percent, the manufacturer will place the order, and perform all other functions to obtain and install the BFE, assuming the risk to meet the assembly schedule. It is believed this method would be preferred by small customers or those desiring a turn-key aircraft purchase.

7. Interface Agreements

An aircraft is a combination of numerous components, many of which are not manufactured by the seller. From time to time, technical problems with parts or assemblies arise and the airline may be unable to identify the cause and the responsible manufacturer or supplier. In these instances the manufacturer, as part of the contract, will step in and assist the airline in identifying the problem and a possible resolution. Interface agreements are created by the aircraft manufacturers wherein they act as middlemen between the buyer, such as an airline, and the manufacturers or suppliers of certain parts or systems included on the aircraft. The purpose of the agreements is to provide technical assistance and to eliminate situations where the airline has a problem with a component, and is put in the middle between the aircraft manufacturer and the component manufacturer or supplier. As a consequence of the interface agreements, the manufacturer identifies the problem and aids the airline in seeking redress from the supplier. In the event a dispute is not settled, the manufacturer will assist the airline in obtaining satisfaction through the courts. Because of the influence of the aircraft manufacturer on

future component orders, the supplier would most likely settle the dispute without this step being taken.

Similiarly, manufacturers will make their best effort to obtain warranties from the manufacturers, vendors, or suppliers of systems, accessories or equipments and pass or assign these down to the buyer of the aircraft.

8. Service Life Policy

A service life policy is similiar to the warranty one usually receives on an automobile battery, for example. As the owner has use of the battery over a period of time, he assumes a larger share of the replacement cost from the manufacturer, should the battery fail before the warranty expires. A service life policy for an aircraft is usually a part of the product support or product assurance program of the manufacturer. The buyer and seller participate in the repair or replacement of covered parts on a sliding scale over a specific time period. As more time passes and the product is used, the buyer of the aircraft assumes a larger percentage of the share ratio. Manufacturers apply this policy either on an individual aircraft basis or to failures which are fleetwide or repetitive. There is no limitation on flight hours or number of landings the craft has logged. The service life policy covers specifically identified components, such as primary structural elements of the wings, fuselage, and tail assembly. Coverage is not considered a warranty, performance guarantee, or an agreement to modify aircraft to conform to the results of developmental changes. The obligation extends to only furnishing corrections or replacement parts. The contract limits the liability for such replacements only to the actual costs. Aircraft are not covered for other losses as the result of these failures, such as the loss of revenue or profit or consequential damages.

The manufacturer participates in the repair of those items listed in the contract over an eight, ten, or twelve year period from the date of delivery of the aircraft and for similar periods commencing at the point when a component or part is replaced. Formulas to be applied in arriving at the current share ratio are provided in the contract. The value of the replacement part is based on the manufacturer's spare parts price list at the time of replacement. There are conditions and limitations on the coverage, such as installation of the replacement part at the buyer's expense and specific manufacturer's notification procedures.

9. Performance Guarantees and Performance Estimates

An airliner is built to a detailed specification, which contains performance goals. The FAA certifies the aircraft based, on the specification and flight testing, to be able to achieve certain levels of performance, such as the range of the aircraft.

Some manufacturers provide specific detailed guarantees as to the performance of the aircraft. Guarantees detail a specific condition, for example, so many pounds of fuel over a certain distance to achieve a certain performance level. Other aircraft manufacturers provide only performance estimates of aircraft they sell. These estimates are also a part of the contract, usually included in the specification. In the case of introduction of a new model while initial sales are taking place, these calculations are actually estimates, unproven until the aircraft flies and is type certified. It should be noted that a manufacturer providing only performance estimates as part of the contract might be induced, as a means of making a sale, to provide a customer with a performance guarantee, but only if it were included in a side letter and only for that one sale.

Interviews with manufacturers disclosed that airlines do not seek performance guarantees, but instead rely on the estimates provided in the specification and the FAA certification. Performance guarantees are most likely to be an issue during the sale of a new model of aircraft. In order to bring about a large sale to an airline, the seller might agree to specific guarantees.

Performance guarantees or estimates which are not achieved by an aircraft are not grounds for rejection of the aircraft by the airline. The most likely resolution would be for the manufacturer to attempt to correct the deficiencies in the aircraft. That attempt failing, a negotiated settlement might result, with the manufacturer paying a penalty to the buyer. It was also noted during interviews with manufacturers, that they felt they have a "moral" responsibility to repair an aircraft not performing up to the standards or estimates, notwithstanding the requirements of the contract.

10. FAA Certification Process

The FAA awards a Type Certificate to the manufacturer for each aircraft model, certifying to the acceptance of that aircraft model in accordance with Part 21 of the Federal Aviation Regulations. The FAA standards are considered a minimum. Certification includes review of design and design process, assembly, as well as flight testing. It is usually awarded to aircraft number one of the model line. Once this type certification is issued, each aircraft, upon assembly, receives either an export or a domestic Standard Certification of Airworthiness after being flown by the manufacturer. Once this certificate is obtained, the aircraft is tendered to the buyer for a demonstration flight, inspection, and acceptance.

C. THE CONTRACT PROCESS

1. Buyer-Seller Relationship

Commercial aircraft manufacturers are in the business of selling aircraft, as well as post delivery product support and spare parts. They sell in a highly charged, world-wide, competitive environment. Their business strategy, as is the aim of any manufacturer, is to convince the customer that the selection of their product over that of a competitors will be profitable for the airline. There is naturally a great deal of uncertainty in the business from the seller's point of view. These uncertainties, such as determining the size of the market for a new aircraft, attempting to sell adequate quantities of the current models to sellers who are having financial difficulties, building to an exacting, albeit, changing standard over which they have little control, keep constant pressure on the manufacturers. Buyers desire to have competition among sellers so they do not become captive to a single manufacturer. Manufacturers attempt to develop very close relationships with each customer. Marketing, or the activity of moving the goods from the seller to the buyer, takes on special significance in the sale of aircraft. The purchase of aircraft is such a large expenditure that salesmen are normally dealing with chief executive officers or the heads of countries. Converseley, the heads of the aerospace firms are actively involved in the sales process, dealing with all customers to some degree, using their influence and prestige to attempt to achieve a sale. From one point of view, they are also a part of the sales staff, appearing on cue from the salesman, to lend an air of importance to any sale or negotiation.

Product support or service after delivery is equally important to both the manufacturer and the airline. This support assists the airlines in keeping the aircraft flying. The manufacturer's industry-wide reputation is based to a large degree on the quality and quantity of the post-delivery support provided. In some instances, the product support function is under the marketing organization.

2. Sales Process

The usual sales process begins when a salesman identifies an airline, a country, a business, or an individual as a potential aircraft customer. At this time the salesman will introduce the potential customer to his customer engineering organization to discuss fundamental points of the aircraft, as well as to marketing personnel who perform a process called fleet planning. Fleet planning and its role in the sale of aircraft will be discussed below. Using a team approach, sales, marketing, engineering and perhaps finance personnel meet with the prospective buyer, developing a general plan for the purchase of the desired aircraft. The plan is based on a general baseline specification, and discussion will establish possible delivery schedules and a base price. If these discussions proceed favorably, a proposal is developed by the manufacturer, putting into writing many of the elements which have been discussed. The proposal would as a minimum identify details of the specification, delivery schedule, and price of the aircraft. This proposal development stage is generally where the contract organization of the manufacturer becomes involved. Depending on the manufacturer, the proposal would be reviewed by higher management, who would give a "go" or "no-go" to the proposal. Other manufacturers would authorize the salesman to present the prepared proposal to the prospect without review. Also, depending on the

manufacturer, a Letter of Intent (LOI), described in detail below, would then be required from the customer.

At this time the customer is given a copy of the manufacturer's pro forma contract for review and has a period of time, usually 30 days, to enter into negotiations. The manufacturer is interested in completing this phase, because he may have commenced production, and thus he is looking for a signed contract from the buyer.

After an order is placed, it normally takes one year to build a commercial wide-body aircraft. Discussions with the manufacturers indicate that there is always a great deal of pressure to keep the production line moving, addressing both production and sales problems as they arise. There may be, for example, concerns regarding the lead-time for certain assemblies, or a large customer may be experiencing financial difficulties. Another concern throughout the assembly process is that a political decision, such as disapproval of an export license will cause a sale to be postponed or lost. In these instances, after upper level management review of the specific situation, a decision would be made to commence or continue production without an executed contract and possibly based only on the LOI. In the industry an unsold aircraft, both during and after assembly is referred to as a "white tail," because of the distinctive absence of an airline's logo on the tail.

3. Airline Fleet Planning

Manufacturers take an active role in assisting airlines in determining their fleet size and the aircraft mix requirements. The process whereby manufacturers provide airlines with strategic analysis and evaluation is called fleet planning. This is a continuing process and also serves as a source of information for the manufacturer to determine what type of aircraft should be built in the

future. As a matter of practice, airlines continuously provide the manufacturers operating performance data on aircraft models. Based on this information, as well as specific information provided by a prospective aircraft buyer, a fleet plan is created. Using the composition of the airline's present fleet, proposed aircraft acquisition and retirement plans, traffic environment, service levels, routes and overall business strategy, a planning model is developed. As the result of iterations of the model, a base plan is developed. The base plan may include traffic and aircraft analysis along with a system survey. Benefits to the airlines include possible optimum fleet mix information which can be valuable in long term planning. In addition to the needs of the airlines for aircraft, the manufacturer provides analysis addressing such issues as facility requirements, aircraft cabin and maintenance personnel requirements, marketing strategy and financial planning. The process is of significant value to the manufacturers from a marketing point of view:

a. fleet planning keeps the manufacturer's name in front of the prospective customer,

b. analysis performed for the airline emphasizes the manufacturer's products, while providing an objective review of the future needs of the airline,

c. the process is directed toward enhancing the buyer-seller relationship; fleet planning is presented as the result of mutual interests, and

d. it provides the manufacturers with data from which trends in the market place can be spotted and analyzed.

4. Proposal and Letter of Intent

The manufacturer's proposal for the aircraft follows discussions with the buyer, thus his needs are well known to the manufacturer. Included in the proposal presented by the salesman to the buyer is a fairly specific configuration of the aircraft, containing the BFE and the desired options, a delivery schedule for each aircraft, the base price for the aircraft and engines, payment terms, progress payment schedule, identification of possible optional aircraft and deposit information. A team composed of personnel from contracts, sales, marketing and finance develop the proposal. Engineering and design personnel are also involved in the process, dealing with the buyer's technical staff, the discussions centering on the specifications. The current trend appears to be for airlines to be less oriented to the technical processes, relying more and more on the aircraft model as presented by the manufacturer.

Letters of Intent (LOI) are notifications by the customer that they intend to purchase aircraft in accordance with the proposal presented by the manufacturer. Additional terms or concessions the customer is seeking might also be listed. The customer is usually required to include a deposit when returning the proposal to the manufacturer. This deposit is considered non-refundable.

The value of a LOI, as contrasted to an acknowledged proposal, is the basis of a difference of opinion within the industry, because a statement which may indicate a willingness to offer or accept is not considered in and of itself to be an offer or acceptance. Some manufacturers consider the executed LOI to be legally binding, while other treat it only as a seller's acknowledgement. During the proposal stage of the sale, the manufacturer is making a commitment to build an aircraft and in some instances, commences work.

Although the customer may put up a deposit, he is able to be released from an agreement prior to his unequivocal acceptance of the offer. The time elapsing between the presentation of a proposal, its acceptance and the signing of a bilateral contract was termed by one manufacturer as the "vulnerable phase." At this point the manufacturer may commence production. However, a contract has not been executed and the customer can abandon the deal very easily.

At the time of submission of a LOI or acceptance of a proposal by the buyer, a "subject to" statement can be added by the customer. Examples of this statement are, "subject to the availability of financing," "subject to the approval of the government," or "subject to negotiations on product support," allowing the customer to change his intentions at a later time.

The UCC is clear in noting that the acceptance of an offer is essential to the creation of a contract. The offeree must accept the terms and conditions of the offer. This acceptance must be positive and unequivocal. This is why manufacturers seek to obtain a contract as soon as possible precluding possible legal entanglements with the buyer, the enforcement of which may have minimal chance of sucesss.

D. THE CONTRACT ORGANIZATION

The contract functional organization of the aircraft manufacturers are fairly standard throughout the industry. The head of contracts is usually a vice president, who reports to a senior vice president of the organization. The directors of the commercial contracts divisions or departments are experienced and talented individuals, responsible for all contracting functions, operating at various levels of autonomy. The management styles of the contract

directors generally reflect the underlying management philosophy of the aerospace firm. There is a preponderance of management, as well as some contract directors working in the directorates, having law degrees. The directorate is generally organized on a regional or customer basis, as are the marketing and sales directorates. The contract function for leased as well as used aircraft might be either included in this organization or under a separate directorate. Purchase by customers of special goods or services, training, planning, and aircraft modifications, might well be conducted in this directorate also. All manufacturers have general counsels, rather than dedicated contract counsel. The general counsels do not work under the contract director. The degree of involvement by counsel in the contract function varies from manufacturer to manufacturer.

Personnel from the contract directorates usually become involved in the selling process when the proposal letter is being prepared. The salesman usually orchestrates the transaction from the presentation of the proposal letter through the delivery of the aircraft, including the post-delivery support of the customer. All members of the manufacturer's selling teams take an active role in the process, particularily the contract directorate. In addition to the development of the proposal letter, other areas where the contracts organization is active include contract interpretation and compliance, taking part in development of financing and lease agreements, and in the acceptance transaction. Manufacturers differ in involvement by the directorate as far as the manufacturing process is concerned. Some have the contracts organization act as a focal point with the aircraft model manager, releasing work orders to various functional elements of the organization, as well as ensuring, for example, that product support, such

as spare parts provisioning, will be completed at the proper time. Other manufacturers, once the contract is executed, pass these types of functions to a separate project organization.

The negotiations with the customer are conducted by the personnel of the contracts directorate, with variations in the support staff taking part. The personnel on the negotiation teams are usually matched to their buyer counterparts. Their strategy is developed by the director in charge of the sale. It is normal and often expected, that at some time during the negotiations with an airline or a political figure from a foreign country, a senior official of the manufacturer, best fitted to the customer, will take part in negotiations. This activity may include presentation of a major (from the buyer's point of view) concession, a signal to the buyer that the manufacturer appreciates the business of the customer. Negotiations are conducted in the offices of the contracting directorate or the customer's place of business. As with all phases of marketing and support of aircraft, there is also a great deal of travel involved in commercial aircraft contracting. These firms are truly dealing with a world-wide market.

The contract directorates are the focal point for all correspondence with customers. Contract administration is also performed in the directorates. As far as office automation is concerned, the directorates have introduced automation at a fairly standard rate. Filing and correspondence systems are, for the most part, automated, greatly assisting in tracking and file searches for documentation. Progress is being made toward directorates having access to computer terminals to assist with pricing analysis.

VI. THE CONTRACT

A. INTRODUCTION

In this chapter an examination is made of the essential articles or clauses of the contract. Article is the term used throughout the industry to describe the components or clauses of the contact. A noted earlier, the term industry contract is used here to describe the normal or usual articles found by the author after interviews with industry personnel and reviews of the pro forma contacts currently used throughout the U.S. commercial aircraft industry. The contract articles presented here are not considered to be fully inclusive, but typify those articles found in the industry as a whole.

B. CONTRACT TYPE

Aircraft are sold on a fixed price basis as the result of negotiations between the parties. A manufacturer's contract would generally first identify the subject matter of the transaction. The aircraft model, relevant specification, and identification of the two parties is simply laid down in the opening statement of the contract document.

C. DELIVERY

Primarily because of sales tax considerations, manufacturers make delivery of the aircraft in specific locations. The states of California and Arizona do not tax aircraft

sold to an airline. Also, these states will not tax sales to other firms as long as the company will, in turn, lease it to a commercial airline. In the state of Washington, the tax law exempts aircraft from sales tax when delivered to airlines, foreign or domestic.

Once the manufacturer obtains a Certificate of Airworthiness from the FAA, for the aircraft to be sold, the buyer is notified and usually has seven days to inspect and accept the aircraft. In the contract, target or schedule months rather than specific days are identified. It is difficult to specify definite dates, other than by month, because the nature of the assembly process is such that long lead-times are involved. Buyers are notified a reasonable period of time (i.e., seven days) in advance of the delivery date. The actual delivery transaction with the customer varies from manufacturer to manufacturer.

A peculiarity of an aircraft sale is that slots or positions in the delivery schedule are vied for by buyers. Slots are created by the sequential nature of the aircraft assembly process. Delivery slots can be traded or sold by airlines. The contract is quite explicit that such transfers or assignments be made only with the approval of the seller. The UCC, Section 2-210(2), is clear that all rights and duties of both buyer and seller are assignable, unless the assignment would materially change the duties of either party, increase the burden of risk imposed by the contract, or where the assignment is contrary to the agreement of the parties. Manufactuerers' marketing departments may also position deliveries, making no-cost tradeoffs between airlines not requiring delivery at the time stipulated in the contract, and customers requiring earlier delivery.

1. Inspection by Buyer

It is stated in the pro forma contract that the customer has the opportunity to inspect the aircraft at any time during the manufacturing process. As a general rule, most airlines do not send inspection representatives to the manufacturing site until the manufacturing process is well along. The contract does not require the buyer to inspect the aircraft, but gives him the right to do so. A few of the larger airlines have relatively small engineering teams on site. The manufacturer provides office space and equipment at the assembly location. In some instances, airlines will inspect only the assembled aircraft. Other airlines will not inspect the aircraft during the assembly process, but rather look at the aircraft manufacturing records and logs.

2. Acceptance

When the seller performs his obligation under the contract by properly tendering conforming goods, the buyer is under a duty to accept the goods. Promptly upon completion of manufacturing and the acceptance flight, each aircraft is tendered for the buyer's acceptance. The contract identifies the place of delivery as the manufacturer's facility. The manufacturer will ferry the aircraft for the customer, but only after it has been accepted by the buyer, thus lessening the manufacturer's risk of loss. The contract indemnifies the manufacturer of all liability during this delivery. The buyer is usually given one week to perform acceptance. If the buyer refuses or is unable to accept an aircraft which meets requirements, he is in default. Usually the only reason why an airline would not accept an aircraft is for financial reasons; they do not have the funds for payment.

Manufacturers conduct test flights for the buyer of each aircraft, usually with a stipulated number (i.e., five) of the buyers' representatives. The seller is at the controls during the flight. Each aircraft is not flown to demonstrate performance estimates or guarantees, this flight is only a demonstration of the aircraft as part of the acceptance process.

3. Open Items

An open item is a manufacturing or assembly defect or deficiency not resolved at the time of turn-over or delivery of the aircraft. Examples are a ripped seat cover on seat B-3 or a malfunction in a single avionics system. Those items which cannot be resolved by the delivery date are resolved by way of an open item letter from the manufacturer identifying the defect and providing a resolution. The letter may, for example, extend the warranty period, or it may require the manufacturer to fix the item within thirty days. Manufacturers disclose that the number of open items found during acceptance has dropped considerably during the past few years. They attribute this drop to an increased concern for productivity by the manufacturer, as well as the work force, and improved quality control and assembly procedures.

D. PRICE AND PAYMENT

1. Sales Price

The sales price of an aircraft is broken down into various components. A base price for each aircraft purchased is established by the manufacturer and consists of a price for the airframe, as well as the price for the selected equipment, such as engines and BFE, which the buyer designated for inclusion in the aircraft. The price also

includes all product support such as training and spare parts. The contract usually stipulates that the base price of the aircraft may be modified during the assembly process by changes to the specification, for instance, when the FAA changes the certification requirements, necessitating modifications. These changes are paid for by the buyer. The base price of the aircraft may also be adjusted during the assembly process by the application of the economic price provisions of the contract. Formulas, based on consumer price indexes (CPI) and other various indexes are included in the contract. Indexes are directed to the quarter prior to the scheduled delivery of the aircraft. Adjustments, for example, may use labor and material price indexes published by the Department of Labor's Bureau of Labor Statistics. Application of the price adjustments to the base price results in what is called a final adjusted aircraft price or the purchase price to the buyer. The actual sales price, the reader is reminded, might be offset to some degree by the contents of a side letter.

2. Progress Payments

The industry-wide terms used to describe payments made prior to delivery of the aircraft are progress payments or advance payments, but the payments actually reflect periodic installment payments by the customer to the manufacturer and are not based on specific demonstrated performance. These periodic payments are required as part of the contract. Payments support the short-term capital needs of the manufacturer, offsetting portions of his financial risk. They usually equal thirty to thirty-five percent of the total cost of the completed airplane, depending on the model and the manufacturer. The first payment is usually due on execution of the contract, and could be five percent of the value of the aircraft or some other specific

amount. A schedule of payments is detailed in the contract, identifying the month or quarter and the amount due. Adjustments to the purchase price brought about by changes in the specification would also be reflected in the progress payment schedule. Progress payments are a negotiable item, and concesssions may be made by the manufacturer.

3. Payment

One of the basic obligations of the buyer is to pay for the aircraft. UCC, Section 2-507(1), provides that:

> "Tender of delivery is a condition to the buyer's duty to accept the goods and, unless otherwise agreed, to his duty to pay for them. Tender entitles the seller to acceptance of the goods and to payment according to the contract."

Generally the entire amount due (other than what was paid as progress payments) including economic escalations, is due and payable on delivery of the aircraft. As stated in the contract, payment is in United States funds, thus the manufacturer is not taking any currency risks. Payment is part of the acceptance process.

E. DELAYS

1. Excusable Delay

There are very few incidents which could occur and would not be considered excusable under the industry contract for aircraft. In addition to acts of God, civil war, epidemics, government allocation, and warlike actions, excusable delays include strikes and work slowdowns, inability after diligent effort to obtain materials, or delays due to any other cause beyond the control of the seller or not occurring through the seller's fault or negligence.

If a customer delays accepting the aircraft, the most likely reason is financing. At that time the manufacturer puts the completed aircraft into storage and charges for preparation for storage, the loss of interest on money which they would have received, taxes charged, and insurance to cover the storage.

If the manufacturer is late with the delivery of an aircraft it is a result of either a single incident or a general program delay. A single incident delay, such as a fire in one of the aircraft, obliges the manufacturer to repair or replace the craft as soon as possible. However, if the model is no longer in production, he is not required to reactivate his production line. Funds in this case could be returned to the buyer, however alternate arrangements for a different model aircraft is a more conceivable resolution. With a general program delay, such as an act of God or a strike, the manufacturer is able to collect additional escalations in price from the customer, based on when the delayed aircraft is finally delivered.

2. Inexcusable Delay

Inexcusable delays are not addressed in the contract. Resolution or remedies for this type of delay would need to be sought by the buyer through arbitration of the courts. An example of an inexcusable delay would be the manufacturer having a problem obtaining type certification or having a certificate discontinued by the FAA, which caused delay in deliveries to airlines. A second example is a delay caused by indirect government action, such as aircraft engines being diverted during a non-declared war. During the Vietnam conflict, this situation occured when an engine manufacturer was directed to fill orders for military aircraft, delaying commercial deliveries. An airline sued the aircraft manufacturer because the conflict was not a

declared war, and thus an inexcusable delay under the terms of the contract. A court found the manufacturer guilty and assessed damages. There should not be a repeat of this incident, as pro forma contracts now include undeclared wars and government allocations as excusable delays.

3. Terminations

The industry contract stipulates that the manufacturer cannot be held in default for excusable delays. Understandably, because of the involved process of assembly of an aircraft, there may be, from time to time, delays in delivery, which the buyer or the seller decide are unacceptable. These circumstances are addressed in the contract as part of the article for excusable delays. Actual or anticipated delays are cause for either party to terminate the contract based on certain conditions. Anticipated delays are based on the manufacturer's appraisal of the facts and attempts, in good faith, to reschedule delivery. The standard found throughout the industry is for fifteen months after the scheduled delivery to have elapsed before the parties can agree to terminate the contract, discharging all obligations. Some sellers allow the buyer the option of termination, based on excusable delay, at a time earlier than fifteen months. As a consequence though, the buyer is required to pay for the aircraft. The manufacturer agrees to deduct the value of any delay insurance he receives on the aircraft as well as the amount received from selling the aircraft elsewhere. These cannot be considered to be liquidated damages, a term not found in the industry contract. Damages, as defined by the Code, would be approprite if either party breached the contract. In this case the airline is exercising a right of the contract, the consequences of which are quite stringent. If either party did breach the contract, damages could be sought through the courts. The Code, Section 2-718(1), provides for liquidated damages:

> "Damages for breach by either party may be liquidated in the agreement by an amount which is reasonable in the light of anticipated or actual harm caused by the breach, the difficulties of proof of loss, and the inconvenience or non-feasibility of otherwise obtaining an adequate remedy."

Default, per se, is not an article in the industry contract. If a default did occur, a resolution would also be sought by arbitration or in the courts. The airlines apparently believe that they will receive an aircraft from the manufacturer, based on past performance, and must accept excusable delays as a part of the risk of entering into the agreement. Conversely, the manufacturer is not seeking to default the buyer. The manufacturer will make every effort to assist the buyer in finding solutions to the problem, in order to avoid a default situation.

F. PRODUCT SUPPORT

Post-delivery support of the manufacturer's product is a very important element in the success of any aircraft program. The reputation of the manufacturer is quite vulnerable in this aspect of the business. The amount or scope of support, as well as the quality are in many instances a deciding factor in aircraft selection by buyers. Aircraft dependability, called dispatch reliability rate, throughout the industry, is a measure of aircraft as well as an airline's performance. Airline's performance in this area is directly related to the effectiviness of a particular manufacturer's support program. It is understood that aircraft manufacturers make money in this phase of the life-cycle of an aircraft, supporting the aircraft over a period of many years, after it has been placed in service by the customer. Product support can be broken down into several parts including maintenance training, flight training, technical data, spare parts and technical service

support. Manufacturers provide various types and quantities of maintenance and flight training, as well as technical data and documentation, as stipulated in the contract. Additional quantities of these services, over and above what might be provided in the contract, may be purchased from the manufacturer.

1. Spare Parts

The spare parts program of the manufacturers provides customers with a complete line of spares support. The program usually includes initial provisioning tailored to the specific airline's needs, inventory support such as a range and depth of spares positioned throughout the world, and emergency service guarantees. Parts support also includes rapid response to aircraft-on-ground situations, an industry term, signalling that an operational aircraft has experienced a failure. As part of the product support article, to meet the demands of the user, parts will be shipped within certain stipulated time periods to meet emergency demands. Manufacturer's programs could also include short-term lease of spares to fill-in for damaged components, such as landing gear, rudders, or slats. Initially, manufacturers may require users to purchase spare parts directly from them. In this instance, airlines find it prudent to do so in order to eliminate possible warranty problems. As an aircraft model matures, secondary sources of many spare parts emerge. These dealers buy from suppliers or obtain used or damaged aircraft and cannibalize them for parts for resale. Manufacturers are careful to protect proprietary-design parts.

2. Technical Service Support

Technical services are commonly divided into field support and factory support. A field support representative is stationed near a buyer's main maintenance center for a specific period of time, or in some instances almost indefinitely. The representative is available for maintenance and repair advice and assistance. Field support or resident service representatives are especially important during introduction of new aircraft. Special teams to address and provide solutions to specific problems are also available from the manufacturer. There is a great deal of public relations value to be realized from field representatives. The relationships they create with customers and their abilities and reputations do much to further the image of the aircraft company.

As a means of providing support to both the airlines as well as the manufacturer's field representatives in the field, technical representatives for each aircraft model are available on an around-the-clock basis. These specialists are located at the manufacturer's facility and are considered factory support. They are linked with the field by various means of communication. They provide solutions to engineering problems with the aircraft, as well as facilities, ground equipment, and maintenance procedures.

Service support is guaranteed by the manufacturer for a specific period of time, such as ten or fifteen years or until, for example, a certain number of units remain in commercial air transport service.

G. WARRANTY

Under the UCC, the concept of warranty covers the obligation of the seller to the buyer with respect to the title, quality, quantity, and condition of past or future

performability of goods sold. Under the law of sales, a warranty is an obligation imposed by law upon the seller with respect to goods. The seller is not required to warrant the goods and may exclude, negotiate, or modify a particular warranty. Warranties are of two types, implied and expressed. When the manufacturer sells an aircraft he implies that he has title to the craft and the legal authority to sell it. The implied warranty rests on the reasonable expectations of the buyer. Express warranties may be made by the manufacturer in their sales and technical literature. *Caveat emptor* was the notion that the seller was allowed to sell his product in any condition that was acceptable to the buyer and that there was not an express warranty. The duty was imposed on the buyer to examine the product he was buying and act on hiw own judgement and at his own risk. Today emphasis is placed on the maxim, *caveat venditor*, let the seller beware. This means the seller is liable for his express warranties and the warranties implied by law. [Ref. 24: p. 495]. Express warranties are found in the sales process, during the negotiations, and in the contract document. An express warranty nullifies an implied warranty to the extent that the implied warranty conflicts with the express warranty. UCC, Section 2-316, provides that warranties may be excluded or modified. Express warranties are excluded by not making them. Implied warranties are excluded or modified by a conspicious statement in the contract. These exclusions must be clearly understood by both parties to the contract.

1. Warranty by the Manufacturers

The warranty coverage provided by the commercial aircraft manufacturers is essentially standard throughout the industy. The warranties provide coverage for accessories, equipment, and parts, or for the installation, if so

performed. Warranty documents for the aircraft are usually included in the product assurance attachment to the basic contract. Warranty coverage is available to the buyer for both manufacturer designed items as well as for items not manufactured by the seller, such as the propulsion systems and BFE. The warranty for these types of equipment or components flows down to the aircraft buyer. As part of product support, manufacturers pass warranties of supplier manufactured items onto the buyer of the aircraft. As mentioned above, interface agreements assist the aircraft buyer in identifying the source of the defect, the responsible party, as well as claim resolution.

The manufacturer's express warranties generally conform to the requirements of the UCC. Normal industry practice is for warranties to be provided for the following:

a. The aircraft title, transfer of which is essential to the sale of the aircraft.

b. Infringement of patents.

c. Conformance to the specification, with the exception of those portions which are estimates or approximations.

d. Freedom of defects in design, material and workmanship.

There are certain periods of time associated with the warranty coverage as well as notification periods. The industry standards are for the design of the aircraft, equipment, accessories and parts to be covered for a period of eighteen months after delivery. Warranties for defects in material and workmanship are for a period of twenty-four months after delivery. In cases where accessories or parts are not normally inspected during these time periods,

warranties are extended to the first scheduled inspection. These time limitations can be considered to be limitations of liability to the manufacturer. Airlines would prefer longer periods of coverage, such as five years. This is a point which airlines actively negotiate, seeking increases of the eighteen and twenty-four month periods. Covered parts and assemblies could include those items installed on the aircraft, as well as spare and replacement parts. The contract lays down in detail the limitations with respect to the buyer's remedies, as well as the manufacturer's obligations and liability.

The usual industry practice is for the airline to file a claim in accordance with the manufacturer's procedures and within specified time limits. The claim is usually filed with the manufacturer's Warranty Administrator, who is located at the administrative headquarters. The manufacturer responds to the claim and directs either replacement of the item, repair of the item, provides other corrective action, or denies the claim. Timely notification by both parties is required. This process takes time. In order to be more responsive to the airlines, one manufacturer has designated the resident service manager in the filed as the official who provides on-the-spot determinations of warranty claims.

All manufacturers have warranty repair programs. These programs allow airlines to peform warranty repairs or replacements on aircraft, once the approval has been received from the manufacturer. Once the work is completed by the maintenance facility, the airline bills the manufacturer for direct labor and materials at previously negotiated rates.

2. Warranty Exclusions

The manufacturer's warranties include certain conditions and exclusions based on UCC, Section 2-316, which allows warranties to be excluded or modified. Recent court decisions have placed emphasis on the exculpation concept, and it is now difficult for manufacturers to dispute warranty claims. Exculpatory pleading by the seller would be made to indicate lack of blame or guilt, in the case of any implied or express warranties made to the buyer. Specific language is required for disclaimer of implied warranties, and to indicate that an agreement has taken place. In the industry contract, in order to reinforce contents of the clause to the buyer, these exclusions are printed in bold type, highlighting the exclusion. This is required by the Code, Sections 2-316(2) and 1-201(10). Additionally, there is a specific clause in the warranty article, which indicates that the contents of the warranty article were discussed, negotiated, and understood by all parties to the contract.

Limitations of coverage increase the predictability of the warranty by essentially eliminating certain risk factors not part of usual design, workmanship, or material defects. By recognizing certain actions as exemptions, the manufacturers decrease the cost of warranty by increasing the predictability of claims. Manufacturers expressly exclude responsiblity for incidental and consequential damages brought about by misuse or improper operation of the aircraft, improper maintenance, accidental damage, and improper repairs or modifications.

VII. SUMMARY OF CONTRACT ISSUES

A. THE CONTRACT PROCESS

Very little prior work exists concerning the commercial aircraft industry's contracting practices. This is apparently due to the sensitivity of this information and the small numbers of manufacturers in the industry which reduce the necessity for open coordination of such practices. In an effort to address this lack of information, this thesis has presented and examined issues found in the contracting process used throughout the commercial aircraft industry. The typical industry contract, based on the legal fundamentals of the Uniform Commercial Code, is a vehicle which specifies the various articles or clauses of the sales agreement and which allocates a portion of risk associated with the assembly of aircraft from the manufacturer to the buyer. The aircraft manufacturing industry has developed pro forma or company-standard contracts which form the foundation of the contract between buyer and seller. These contracts may be modified or amended. The basic contract and modifications are required to be filed with the Federal Aviation Administration (FAA). A device used throughout the industry to limit or enhance the sales agreement is called a side letter. Because the side letter is usually specific to a single transaction, the concessions or obligations of the two parties are not public knowledge. Thus, the side letters may not influence later agreements between competing buyers and sellers.

Prior to sale of an aircraft model, the manufacturer must deal with various risks and uncertainties, such as which model to build, the size of the investment in design,

tooling and other pre-production outlays. Specifications for a model of an aircraft are fashioned by the manufacturer based on what he views as the needs of the marketplace. The endeavor at this point is to decide how many units will be absorbed by the market in the long run and the use of learning curve methodology to establish a price for the aircraft.

There is vigorous competition between the manufacturers of aircraft to sell their products. Once a potential customer is identified, the contract organization of the manufacturer joins the sales effort. At this point a proposal is prepared by the manufacturer. Other areas where the contract functional organization is involved might be with the financing and product support packages, contract interpretation, and delivery and acceptance of the aircraft by the customer. The purchaser of the aircraft buys an aircraft of a fairly standard design, which conforms to the model specification developed by the manufacturer and type certified by the FAA. The purchaser may, and most likely will, enhance the model with the addition of standard options and buyer furnished equipment.

During the production of the aircraft, there are many reasons why an aircraft might be delayed. Most instances are considered to be excusable under the terms of the contract. Also, during the production process, the buyer is required to make progress or advance payments, not based on actual progress, but rather on a schedule established in the contract. The delivery and acceptance of the aircraft takes place in accordance with established procedures.

A major portion of the manufacturer's effort which has significant effect on the firm's reputation deals with the aircraft and the buyer after delivery has taken place. Product support is the term used to describe the manufacturer's post-delivery support of the aircraft. This support

might include sale of spare parts, training, and technical assistance with the aircraft. Various quantities of support are included in the contract as part of the purchase. Additional support can be purchased by the aircraft buyers. During the entire sales and production process, the manufacturer must deal with vigorous competition, cycles in the demand for aircraft, quality and the timeliness of deliveries from component suppliers, and the buyer's ability to purchase the product. These factors are addressed after the firm has invested heavily in design, pre-production tooling and materials, in order to bring a product to the marketplace and capture sales.

B. RISK

As noted earlier in this work, the aircraft industry for the buyer as well as the seller is a dynamic, cyclical and competitive undertaking between billion dollar corporations. The aircraft manufacturers, along with the engine and component suppliers, have provided a reliable and safe product. Underlying their success has been the firms' abilities to deal with the uncertainties inherent in the industry. These uncertainties are not entirely unique to manufacturers of large scale, technical equipment. It is the amplitude of the monetary risk which makes the manufacture of commercial aircraft truly unique. Associating this risk with the financial size of the needed investment, results in risk which is difficult to grasp. However, it is not valid to label the industry as having high risk with a low return, nor is it appropriate to identify their profits as normal without identification of the associated risks.

C. CONCLUSION

The purpose of this effort has been to provide a review of the commercial aircraft industry and to identify contract issues and practices. Areas where uncertainty or risk are perceived by this author have been identified. Certain risks inherent in the airline industry are distinctive, but not totally unique. What is unique is the size of the monetary risk, the abundance and magnitude of technological uncertainty and the influence and dominance that world-wide politics and economics have on the industry. The contract is the vehicle with which the manufacturer allocates a portion of the risk to the buyer. Contract articles dealing with warranty, product liability, progress payments, acceptance and delivery are examples of standard industry practices where this is accomplished. Additionally, manufacturers recently have had to take a different view of financing for their products because of the customer's inability to pay for aircraft. They have, in turn, shared some of this risk by having component suppliers, such as engine manufacturers, share in this undertaking. For the future, the manufacturers need to ameliorate the adverse effects of uncertainty. Standard and Poor's Corporation holds the view that manufacturer's business successes will be based on careful risk-management, cautious market evaluation and, perhaps most importantly, formulation of manufacturing partnerships [Ref. 15: p. A 46]. This trend of collaboration by aircraft manufacturers may be emerging from such recent actions as Boeing's use of a consortium in the development and production of the model 767 and Lockheed's expressed intentions of reentering the commercial market only as a subcontractor or a member of a consortium.

LIST OF REFERENCES

1. Aerospace Industry Association of America, Inc., Washington, D.C., *Aerospace Facts and Figures 1982/83*, Published by *Aviation Week and Space Technology*, 1982.

2. *1983 U.S. Industrial Outlook*, U.S. Department of Commerce, Washington, D.C., 1982.

3. Mahon, G., "Dogfight in Aerospace", *Barrons*, v. LXIII, no. 18, May 2, 1982.

4. Bluestone, B., Jordan, P., and Sullivan, M., *Aircraft Industry Dynamics* Auburn House Publishing Company, 1981.

5. Canning, T., *Aerospace and Air Transport, Current Analysis*, Standard and Poor's Corporation, New York, *June 30*, 1983.

6. Banks, H., "Holding for Takeoff," *Forbes*, v. 131, no. 13, June 20, 1983.

7. "End of an Era for 727, World's Most Popular Jet," *San Francisco Examiner Chronicle*, 17 July 1983.

8. The Boeing Company, *Form 10-K* for fiscal year ending December 31, 1982.

9. Newhouse, J., *The Sporty Game*, Knopf, 1982.

10. The Boeing Company, *Annual Report*, 1982.

11. McDonnell Douglas Corporation, *Form 10-K* for fiscal year ending December 31, 1982.

12. Ropelewski, R.R., "New Engines Boost MD-100 Plans," *Aviation Week and Space Technology*, v. 119, no. 4, July 25, 1983.

13. Feldman, J.M., "Innovative Financing Might Be Here to Stay," *Air Transport World*, v. 20, no. 6, June 1983.

14. "McDonnell Needs About $700 Million For Lease Program," *The Wall Street Journal*, March 29, 1983.

15. Standard & Poor's Corporation, New York, *Industry Surveys - Air Transport*, December 1982.

16. Donoghue, J. A., "Air Frames Enter A New Era, Buying And Selling Used Airplanes," *Air Transport World*, v. 21, no. 7, July 1983.

17. Williams, J. D., "Airlines Ending Some Discounts, Seeking a Profit," *The Wall Street Journal*, June 27, 1983.

18. Eastern Air Lines, Inc., *Form 10-K*, for fiscal year ending December 31, 1982.

19. Delta Air Lines, Inc., *Form 10-K*, for fiscal year ending June 30, 1982.

20. UAL, Inc., *Form 10-K* for fiscal year ending December 31, 1982.

21. *Uniform Commercial Code*, prepared by the National Conference on Commissioners on United States Laws and the American Law Insititue, 1962 Official Edition.

22. Wyatt, J. L. and Wright, M.B., *Business Law*, 4th ed., McGraw Hill, 1971.

23. Nordstrom, R.J., *Handbook of the Law of Sales*, West Publishing Company, 1970.

24. Smith, L.Y. and Roberson, G., *American Business Law*, 2nd ed., v. 1, West Publications, 1971.

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